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| DAO | Service | Controller | Webapp |
| ExcelReader(exelFile)  getCell(sheet,cellId)  setCellValue(cell, value)  getCellValue(cell): value  update (sheetCells) | Manager(ExcelReader, variableCellMappings)  jsonStringToObject()  setValues(input)  resolve the variable with the cellid  getValues(): ouput  update() | new ExcelReader(exelFile)  variableCellMappings | Input = {k1:v1….knvn}  output= {k1:v1….kmvm} |

# How to add an input variable?

1. In biogas-calculator.jsp page, create a text box and define a variable e.g. cows .
2. In biogas-calculator.js, declare an input variable cows at the beginning.
   1. In getInputJson(), add the variable name and variable e.g. new Map("cows",parseInt(cows)). e.g.
   2. Add an event for the input text box that you created in step 1. An example is given below.

$("#cowSlurry").change(function() {

var value = $("#cowSlurry").val();

console.log("cowSlurry = "+value);

cowSlurry= parseInt(value);

update();

});

1. In HomeController.java , there is a method called createVariableCellMappings()   
   add the cell-id of the variable from the spread sheet. e.g. {"cows","0","d4","number","input"},

# How to add an output variable?

1. Steps 1, 3 are the same for output variables
2. In biogas-calculator.js, in the function update(), bind the result with the new html tag id. E.g. $("#cowBiogas").text( biogasJson.cowBiogas);